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Claims

What is claimed is:

- 5 1. Autostereoscopic projection arrangement, comprising:
- at least one projector and
 - at least one filter array having a multitude of filter elements arranged in col-
umns and rows, in which
 - by means of the projector/the projectors bits of partial information from views
10 of a scene or object are projected onto a projection screen, where these bits of
partial information are rendered on image rendering elements and, having
passed one or several of the filter arrays, are made visible to at least one ob-
server, and in which
 - the image rendering elements correspond with correlated filter elements, as
15 regards the propagation direction of the bits of partial information, in such a
way that an observer will see predominantly bits of partial information from a
first selection of views with one eye and predominantly bits of partial informa-
tion from a second selection of views with the other, so that he will have a spa-
tial impression.
- 20 2. Autostereoscopic projection arrangement acc. to Claim 1, comprising:
- at least two projectors,
 - a projection screen,
 - at least two filter arrays ($F_1, F_2, \dots, F_A, \dots$), in which at least one filter array (F_1) is
25 arranged between the projection screen and the projectors, i.e. behind the pro-
jection screen (in viewing direction), and at least one filter array (F_2) in front of
the projection screen (in viewing direction), and in which
 - all filter arrays ($F_1, F_2, \dots, F_A, \dots$) have wavelength filter elements arranged in col-
umns and rows that are transparent to light of different wavelengths (λ) or dif-
30 ferent wavelength regions ($\Delta\lambda$), and in which
 - by means of the projectors bits of partial information from n views (A_k with
 $k=1 \dots n$; $n \geq 2$) of a scene or object are projected through at least one filter array
(F_1) and onto the projection screen, so that bits of partial information of views
 A_k are made optically visible on the projection screen in combination or mix
35 determined by the geometry of the arrangement, and the projection screen is
divided into a grid of sufficient resolution, consisting of image rendering ele-
ments (α_{ij}) which are arranged in columns (i) and rows (j) and, depending on

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the embodiment of the filter arrays ($F_1, F_2, \dots F_A, \dots$) and the projectors, radiate light of particular wavelengths (λ) or wavelength ranges, with each image rendering element (α_{ij}) rendering bits of partial information of at least one of the views A_k , and in which

- 5 – the at least one filter array (F_2) arranged in front of the projection screen (in viewing direction) defines propagation directions for the light radiated by the projection screen toward the observer, in which any one image rendering element (α_{ij}) corresponds with several allocated wavelength filters n of the filter array (F_2), or one wavelength filter of the filter array (F_2) corresponds with several allocated image rendering elements (α_{ij}), in such a way that the straight line connecting the centroid of the cross-section area of a visible portion of the image rendering element (α_{ij}) and the centroid of the cross-section area of a visible portion of the wavelength filter represents one propagation direction, so that, from every viewing position, an observer will see predominantly bits of partial information of a first selection of views (A_k) with one eye, and predominantly bits of partial information of a second selection of views with the other eye, so as to have a spatial impression from a multitude of viewing positions.

3. Autostereoscopic projection arrangement acc. to Claim 2, characterized in that each of the filter arrays ($F_1, F_2, \dots F_A, \dots$) contains wavelength filter elements (β_{Apq}) arranged in a specific grid assigned to it, consisting of rows (q_A) and columns (p_A), which are arranged on the filter array depending on their transmission wavelength or their transmission wavelength range (λ_b) according to the following function:

$$25 \quad b = p_A - d_{Apq} \cdot q_A - n_{Am} \cdot \text{IntegerPart} \left[\frac{p_A - d_{Apq} \cdot q_A - 1}{n_{Am}} \right], \text{ wherein}$$

- ($p_A=p$) is the index of a wavelength filter (β_{Apq}) in a row of the respective array (F_A),
 – ($q_A=q$) is the index of a wavelength filter (β_{Apq}) in a column of the respective array (F_A),
 30 – (b) is an integer that defines one of the specified transmission wavelengths/wavelength ranges (λ_b) for a wavelength filter (β_{Apq}) of the filter array (F_A) in the position (p_A, q_A), and may have values between 1 and b_{Amax} ,
 – (n_{Am}) is an integer greater than zero that preferably corresponds to the total number (n) of the views (A_k) displayed by the projectors,

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- (d_{Apq}) is a selectable mask coefficient matrix for varying the arrangement of the wavelength filters on the respective array (F_A), and
- *IntegerPart* is a function for generating the greatest integer that does not exceed the argument put in square brackets.

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4. Autostereoscopic projection arrangement acc. to Claim 2 or 3, characterized in that

- at least two of the filter arrays cannot be made completely congruent by horizontal and/or vertical linear scaling of their structures,

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- the filter arrays ($F_1, F_2, \dots, F_A, \dots$) are arranged at a distance (z_A) in front or behind the projection screen (in viewing direction), respectively, in which (z_A) may adopt values in the range of $-60 \text{ mm} \leq (z_A) \leq 60 \text{ mm}$, with a negative value of (z_A) meaning arrangement in front of the projection screen (in viewing direction) and a positive value of (z_A) meaning arrangement behind the projection screen (in viewing direction) at the respective distance given by the absolute amount of (z_A), and/or

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- at least one filter element of at least one of the filter arrays ($F_1, F_2, \dots, F_A, \dots$) is configured as a lens, preferably as a cylindrical lens, or as a prism, with the possible variation that the cylindrical lenses or prisms may be arranged in columns only or in rows only.

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5. Autostereoscopic projection arrangement acc. to any of the Claims 2 through 4, characterized in that

- the projection screen is translucent, and/or

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- at least one of the projectors projects a combination image composed of bits of partial information of at least two views (A_k), in which preferably two projectors each project a combination image composed of bits of partial information of at least two views (A_k) and the image combination structure of the views (A_k) selected differs for the said two projectors.

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6. Autostereoscopic projection arrangement acc. to Claim 1, comprising:

- at least two projectors,
- a projection screen suitable for front projection,
- a filter array arranged between the projection screen and the projectors, in which
- the filter array has wavelength filter elements that are arranged in columns and rows, are transparent to light of different wavelengths (λ) or different wave-

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- length regions ($\Delta\lambda$), and absorb the light that is not transmitted at least partially, but preferably to a high degree, and in which
- by means of the projectors bits of partial information from n views (A_k with $k=1..n$; $n \geq 2$) of a scene or object are projected through the filter array and onto the projection screen, so that bits of partial information of views A_k are made optically visible on the projection screen in combination or mix determined by the geometry of the arrangement, and the projection screen is divided into a grid of sufficient resolution, consisting of image rendering elements (α_{ij}) which are arranged in columns (i) and rows (j) and, depending on the embodiment of the filter array and the projectors, radiate light of particular wavelengths (λ) or wavelength ranges, with each image rendering element (α_{ij}) rendering bits of partial information of at least one of the views A_k , and in which
 - the filter array defines propagation directions for the light radiated by the projection screen toward the observer on the projector side, in which any one image rendering element (α_{ij}) corresponds with several allocated wavelength filters n of the filter array, or one wavelength filter of the filter array corresponds with several allocated image rendering elements (α_{ij}), in such a way that the straight line connecting the centroid of the cross-section area of a visible portion of the image rendering element (α_{ij}) and the centroid of the cross-section area of a visible portion of the wavelength filter represents one propagation direction, so that, from every viewing position, an observer will see predominantly bits of partial information of a first selection of views (A_k) with one eye, and predominantly bits of partial information of a second selection of views with the other eye, so as to have a spatial impression from a multitude of viewing positions.
7. Autostereoscopic projection arrangement acc. to Claim 6, characterized in that the filter array contains wavelength filter elements (β_{pq}) in a grid of rows (q) and columns (p), which, depending on their transmission wavelength/their transmission wavelength range (λ_b) are arranged on the filter array according to the following function:
- $$b = p - d_{pq} \cdot q - n_m \cdot \text{IntegerPart} \left[\frac{p - d_{pq} \cdot q - 1}{n_m} \right], \text{ wherein}$$
- (p) is the index of a wavelength filter β_{pq} in a row of the array,
 - (q) is the index of a wavelength filter β_{pq} in a column of the array,

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- (b) is an integer that defines one of the specified transmission wavelengths/wavelength ranges (λ_b) for a wavelength filter (β_{pq}) of the filter array in the position (p,q), and may have values between 1 and b_{max} ,
 - (n_m) is an integer greater than zero that preferably corresponds to the total number (n) of the views (A_k) displayed by the projectors,
 - (d_{pq}) is a selectable mask coefficient matrix for varying the arrangement of the wavelength filters on the array, and
 - *IntegerPart* is a function for generating the greatest integer that does not exceed the argument put in square brackets.
8. Autostereoscopic projection arrangement acc. to Claim 6 or 7, characterized in that
- the filter array is arranged on the projector side of the projection screen at a distance (z) in front of the latter, with (z) adopting values in the range of $0 \text{ mm} \leq z \leq 60 \text{ mm}$, and/or
 - at least some of the filter elements of the filter array are designed so as to transmit light from selected directions of incidence only.
9. Autostereoscopic projection arrangement acc. to Claim 1, comprising:
- one projector,
 - a projection screen suitable for front projection,
 - a filter array arranged between the projection screen and the projector, in which
 - the filter array has wavelength filter elements that are arranged in columns and rows, are transparent to light of different wavelengths (λ) or different wavelength regions ($\Delta\lambda$), and absorb the light that is not transmitted at least partially, but preferably to a high degree, and in which
 - by means of the projector bits of partial information from n views (A_k with $k=1..n$; $n \geq 2$) of a scene or object are projected through the filter array and onto the projection screen, so that bits of partial information of views A_k are made optically visible on the projection screen in combination or mix determined by the geometry of the arrangement, and the projection screen is divided into a grid of sufficient resolution, consisting of image rendering elements (α_{ij}) which are arranged in columns (i) and rows (j) and, depending on the embodiment of the filter array and the projector, radiate light of particular wavelengths (λ) or wavelength ranges, with each image rendering element (α_{ij})

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rendering bits of partial information of at least one of the views A_k , and in which

- the filter array defines propagation directions for the light radiated by the projection screen toward the observer on the projector side, in which any one image rendering element (α_{ij}) corresponds with several allocated wavelength filters n of the filter array, or one wavelength filter of the filter array corresponds with several allocated image rendering elements (α_{ij}), in such a way that the straight line connecting the centroid of the cross-section area of a visible portion of the image rendering element (α_{ij}) and the centroid of the cross-section area of a visible portion of the wavelength filter represents one propagation direction, so that, from every viewing position, an observer will see predominantly bits of partial information of a first selection of views (A_k) with one eye, and predominantly bits of partial information of a second selection of views with the other eye, so as to have a spatial impression from a multitude of viewing positions.

10. Autostereoscopic projection arrangement acc. to Claim 1, comprising:
 - one projector,
 - a translucent projection screen,
 - 20 - at least two filter arrays ($F_1, F_2, \dots, F_A, \dots$), in which at least one filter array (F_1) is arranged between the projection screen and the projector, i.e. behind the projection screen (in viewing direction), and at least one filter array (F_2) in front of the projection screen (in viewing direction), and in which
 - all filter arrays ($F_1, F_2, \dots, F_A, \dots$) have wavelength filter elements arranged in columns and rows that are transparent to light of different wavelengths (λ) or different wavelength regions ($\Delta\lambda$), and in which
 - by means of the projector bits of partial information from n views (A_k with $k=1..n$; $n \geq 2$) of a scene or object are projected through at least one filter array (F_1) and onto the projection screen, so that bits of partial information of views A_k are made optically visible on the projection screen in combination or mix determined by the geometry of the arrangement, and the projection screen is divided into a grid of sufficient resolution, consisting of image rendering elements (α_{ij}) which are arranged in columns (i) and rows (j) and, depending on the embodiment of the filter arrays ($F_1, F_2, \dots, F_A, \dots$) and the projector, radiate light of particular wavelengths (λ) or wavelength ranges, with each image rendering element (α_{ij}) rendering bits of partial information of at least one of the views A_k , and in which

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- the at least one filter array (F_2) arranged in front of the projection screen (in viewing direction) defines propagation directions for the light radiated by the projection screen toward the observer, in which any one image rendering element (α_{ij}) corresponds with several allocated wavelength filters n of the filter array (F_2), or one wavelength filter of the filter array (F_2) corresponds with several allocated image rendering elements (α_{ij}), in such a way that the straight line connecting the centroid of the cross-section area of a visible portion of the image rendering element (α_{ij}) and the centroid of the cross-section area of a visible portion of the wavelength filter represents one propagation direction, so that, from every viewing position, an observer will see predominantly bits of partial information of a first selection of views (A_k) with one eye, and predominantly bits of partial information of a second selection of views with the other eye, so as to have a spatial impression from a multitude of viewing positions.
- 11. Autostereoscopic projection arrangement acc. to Claim 9 or 10, characterized in that

 - the projector radiates light of different wavelengths or wavelength ranges in succession, and the bits of partial information of each of the n views are radiated in pairs of different wavelengths or wavelength ranges, in which preferably
 - bits of partial information of $n=3$ views (A_k with $k=1..n$) are displayed, the projector is a DMD/DLP projector, and view A_1 ($k=1$) is displayed exclusively in red, view A_2 ($k=2$) exclusively in green, and view A_3 ($k=3$) exclusively in blue.
- 12. Autostereoscopic projection arrangement acc. to Claim 1, comprising:

 - a translucent projection screen,
 - one projector arranged behind the projection screen (in viewing direction),
 - at least one filter array arranged in front of the projection screen (in viewing direction), in which
 - the filter array has wavelength filter elements arranged in columns and rows that are transparent to light of different wavelengths (λ) or different wavelength regions ($\Delta\lambda$), and in which
 - by means of the projector bits of partial information von (n) views (A_k with $k=1..n$; $n \geq 2$) of a scene or object, in a defined combination of the bits of partial information, are projected directly onto the projection screen, so that bits of partial information of the views (A_k) are made optically visible on the projection screen, and the projection screen is divided into a grid of sufficient resolution,

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- consisting of image rendering elements (α_{ij}) which are arranged in columns (i) and rows (j) and, depending on the embodiment of the projector, radiate light of particular wavelengths (λ) or wavelength ranges, with each image rendering element (α_{ij}) rendering bits of partial information of at least one of the views A_k , and in which
- 5 – the at least one filter array defines propagation directions for the light radiated by the projection screen toward the observer, in which any one image rendering element (α_{ij}) corresponds with several allocated wavelength filters n of the filter array, or one wavelength filter of the filter array corresponds with several
- 10 allocated image rendering elements (α_{ij}), in such a way that the straight line connecting the centroid of the cross-section area of a visible portion of the image rendering element (α_{ij}) and the centroid of the cross-section area of a visible portion of the wavelength filter represents one propagation direction, so that, from every viewing position, an observer will see predominantly bits of
- 15 partial information of a first selection of views (A_k) with one eye, and predominantly bits of partial information of a second selection of views with the other eye, so as to have a spatial impression from a multitude of viewing positions.
13. Autostereoscopic projection arrangement according to any one of the previous
- 20 Claims, characterized in that the projected bits of partial information of the views (A_k) are projected together with the use of an image pre-rectification function.
14. Autostereoscopic projection arrangement according to any one of the previous
- 25 claims, characterized in that
- the alignment and structure of the filter array / the filter arrays between the projectors and the projection screen are selected in such a way that each image rendering element on the projection screen can receive light from at least one of the projectors, and
- 30 – the projection screen is curved, so that essentially equal angles of incidence are obtained for the light received from the various projectors, and/or
- for each projector, a separate projection position and projection direction is specified related to the projection screen, preferably with the projection direction and the projection distance differing from projector to projector.
- 35 15. Autostereoscopic projection arrangement according to any one of the previous claims, characterized in that

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- The brightness of at least one projector is variable within specified limits, and
 - Use is made preferably of slide projectors, DLP/DMD projectors, CRT projectors or liquid crystal projectors.
- 5 16. Autostereoscopic projection arrangement according to any one of the previous claims, characterized in that the filter array located nearest to the observer is provided with an antireflection coating.
- 10 17. Autostereoscopic projection arrangement according to any one of the previous claims, characterized in that
- the filter arrays ($F_1, F_2, \dots, F_A, \dots$) are designed as an exposed film, a printed pattern or an optical grating,
 - at least one of the filter arrays ($F_1, F_2, \dots, F_A, \dots$) is laminated onto a substrate, preferably a glass substrate, and/or
 - 15 - at least one of the filter arrays ($F_1, F_2, \dots, F_A, \dots$) is arranged within a sandwich stack of several substrates, each substrate having specified optical properties such as refractive indices.
- 20 18. Autostereoscopic projection arrangement according to any one of the previous claims, characterized in that
- the projection screen is designed as a very thin wafer, preferably of a thickness smaller than one millimeter, by which an excellent definition of the image rendering elements on the projection screen is achieved, and/or
 - the projection screen has a light-concentrating effect, i.e. a positive gain.
- 25 19. Autostereoscopic projection arrangement according to any one of the previous claims, characterized in that parts of at least one filter array are provided with a reflecting surface that is arranged on the side(s) of the filter array(s) facing the projectors and is preferably provided on the non-transparent filter elements only, so that part of the light projected is reflected back into the projectors.
- 30 20. Autostereoscopic projection arrangement according to any one of the previous claims, characterized in that
- 35 - at least some of the filter elements of at least one of the filter arrays are designed as polarizing filters, and at least one of the projectors radiates polarized light, in which preferably

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- the polarized light radiated by the at least one projector alternates in time, preferably between horizontally linear and vertically linear polarization.
21. Autostereoscopic projection arrangement according to any one of the previous
5 claims, characterized in that at least some of the filter elements of at least one of the filter arrays are designed as photochromic or electrochromic optical elements.
22. Autostereoscopic projection arrangement according to any one of the previous
10 claims, characterized in that
- at least one of the projectors is provided with a color filter, by means of which the light radiated by the said projector can only pass wavelength filters of the respective transmission wavelength or the respective transmission wavelength range, and
 - 15 – the projectors are arranged in at least two essentially horizontal tiers, and in that
 - means for the automatic alignment of the projectors, e.g., electro-mechanical control elements are provided, and/or
 - the path of the light radiated by at least one projector is folded by means of at
20 least one mirror, with the folded light path preferably causing a light incidence on the projection screen that is non-perpendicular relative to the main direction of light propagation, and the projection screen is designed as a holographic disk that especially transmits and concentrates light incident other than perpendicularly.
23. Autostereoscopic projection arrangement according to any one of the previous
25 claims, characterized in that
- at least some of the filter elements are designed as neutral density filters for the wavelength-independent attenuation of the light intensity, and/or
 - 30 – the filter elements have outlines of any, preferably polygonal, more preferably rectangular shape.
24. Autostereoscopic projection arrangement, comprising:
- at least one projector for the backprojection of bits of partial image information from at least two views of a scene or object onto a holographic screen, in
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- the holographic screen has a multitude of holographic optical elements (HOEs) that are arranged in a grid of columns and/or rows, and
 - the light incident from the projector is, by means of an optical imaging system, directed onto the holographic screen in such a way that the multitude of HOEs define a multitude of propagation directions, so that an observer will see predominantly bits of partial information of a first selection of views with one eye and predominantly bits of partial information of a second selection of views with the other eye, and thus will have a spatial impression from a multitude of viewing positions.
25. Autostereoscopic projection arrangement acc. to Claim 24, comprising:
- at least one projector for the backprojection of bits of partial image information from at least two views A_k ($k=1..n$, $n \geq 2$) of a scene or object onto a holographic screen, in which
 - the holographic screen has a multitude of holographic optical elements (HOEs) arranged in a grid of columns and/or rows, and in which
 - each HOE displays the light incident from at least one projector by means of at least one of the following optical imaging types or combinations of imaging types:
 - a) Imaging by means of a lens, preferably a cylindrical lens arranged vertically or obliquely to the vertical,
 - b) Diffusely transparent or translucent imaging, with subsequent imaging by means of a lens, preferably a cylindrical lens arranged vertically or obliquely to the vertical,
 - c) Imaging by means of a prism,
 - d) Diffusely transparent or translucent imaging, with subsequent imaging by means of a prism, -
 - e) Imaging through a polygonal polarizing filter and/or stepped neutral density filter and/or wavelength filter, with a wavelength filter transmitting light of a specified wavelength or one or several specified wavelength ranges,
 - f) Imaging according to e) plus diffusely transparent or translucent imaging,
 - g) Imaging according to f) and subsequently according to e),
 - h) Imaging by means of an optical flat,
 - i) Imaging by diffraction,
- so that the imaging actions of the multitude of HOEs define a multitude of propagation directions for the light cast toward the observer by the front side

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- of the holographic screen, with each HOE defining one or several light propagation directions for the light incident on it, which corresponds to bits of partial image information of at least one of the views projected, so that, from every viewing position, an observer will see predominantly bits of partial information of a first selection of views (A_k) with one eye and predominantly bits of partial information of a second selection with the other eye and thus will have a spatial impression from a great number of viewing positions.
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26. Autostereoscopic projection arrangement acc. to Claim 25, characterized in that
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- eight projectors, each of which renders one view of the scene or object, are arranged on a circular arc, with the imaging beam paths of the projectors being directed onto the rear side of the holographic screen and the optical axes of these imaging beam paths including angles of $\alpha \approx 8.6^\circ$,
 - 15 - the HOEs are spaced from each other on the holographic screen by approximately 0.1 mm in both coordinates, and
 - the propagation directions of the light radiated by the holographic screen and carrying bits of partial information of the views include angles of $\beta \approx 0.83^\circ$, in which
 - 20 - the multitude of viewing positions are established at a distance of approximately 4.5 m from the holographic screen.
27. Autostereoscopic projection arrangement acc. to Claim 25, characterized in that
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- four projectors, each of which renders two views of the scene or object, are arranged on a circular arc, with the imaging beam paths of the projectors being directed onto the rear side of the holographic screen and the optical axes of these imaging beam paths including angles of $\alpha \approx 17.2^\circ$,
 - the HOEs are spaced from each other on the holographic screen by approximately 0.1 mm in both coordinates, and
 - 30 - the propagation directions of the light radiated by the holographic screen and carrying bits of partial information of the views include angles of $\beta \approx 17.2^\circ$, in which
 - the multitude of viewing positions are established at a distance of approximately 4.5 m from the holographic screen.
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28. Autostereoscopic projection arrangement acc. to Claim 24 comprising:

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- at least one projector for the front-side projection of bits of partial image information from at least two views A_k ($k=1..n$, $n \geq 2$) of a scene or object onto a holographic screen, in which
 - the holographic screen has a multitude of holographic optical elements (HOEs) arranged in a grid of columns and/or rows, and in which
 - each HOE displays the light incident from at least one projector by means of at least one of the following optical imaging types or combinations of imaging types:
 - a) Imaging by means of a concave or convex mirror, preferably a cylindrical concave mirror arranged vertically or obliquely to the vertical,
 - b) Diffuse reflection, with subsequent imaging of a concave or convex mirror, preferably a cylindrical concave mirror arranged vertically or obliquely to the vertical,
 - c) Imaging by means of a doublet or triplet of mirrors (corner reflector),
 - d) Diffuse reflection, with subsequent imaging by means of a doublet or triplet of mirrors,
 - e) Imaging through a polygonal polarizing filter and/or stepped neutral density filter and/or wavelength filter, with a wavelength filter transmitting light of a specified wavelength or one or several specified wavelength ranges,
 - f) Imaging according to e) plus diffuse reflection, with subsequent imaging according to e) again,
 - g) Diffuse reflection, with subsequent imaging by means of an optical flat,
 - h) Diffuse reflection, with subsequent imaging by means of a prism,
 - i) Imaging by diffraction,
- so that the imaging actions of the multitude of HOEs define a multitude of propagation directions for the light cast toward the observer by the front side of the holographic screen, with each HOE defining one or several light propagation directions for the light incident on it, which corresponds to bits of partial image information of at least one of the at least two views projected, so that, from every viewing position, an observer will see predominantly bits of partial information of a first selection of views (A_k) with one eye and predominantly bits of partial information of a second selection with the other eye and thus will have a spatial impression from a great number of viewing positions.
29. Autostereoscopic projection arrangement acc. to any of the Claims 24 through 28, characterized in that

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- all HOEs implement the same of the optical imaging types or combinations of imaging types a)-i), or
 - at least two of the HOEs implement pairs of different optical imaging types or combinations of imaging types a)-i), or
 - 5 – at least one HOE implements at least two of the optical imaging types or combinations of imaging types a)-i).
30. Autostereoscopic projection arrangement acc. to any of the Claims 24 through 29, characterized in that
- 10 – at least two of the HOEs on the holographic screen deviate from each other in their outer dimensions and/or their outer shape, or
- the relative positions of the area centroids of at least two of the HOEs on the holographic screen deviate from each other by an offset equal to a non-integral multiple of the width and/or height of one of the said HOEs.
- 15 31. Autostereoscopic projection arrangement acc. to any of the Claims 24 through 30, characterized in that at least one of the HOE displays light of different wavelength ranges in pairs of disjoint directions.
- 20 32. Autostereoscopic projection arrangement acc. to any of the Claims 24 through 31, characterized in that
- the grid in which die HOEs are arranged on the holographic screen is an orthogonal grid, or
- the grid in which die HOEs are arranged on the holographic screen is a non-orthogonal grid, preferably one in which the direction of the rows intersects
- 25 the direction of the columns at an angle that is not equal to 90 degrees.
33. Autostereoscopic projection arrangement acc. to any of the Claims 24 through 32, characterized in that at least one HOE simultaneously defines at least two
- 30 light propagation directions for light from of at least one direction of incidence.
34. Autostereoscopic projection arrangement acc. to any of the Claims 24 through 33, characterized in that
- 35 – It contains at least two projectors, with each projector projecting either bits of partial image information of only one view of a scene or object, or simultane-

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ously bits of partial image information of at least two views of a scene or object,

- at least one projector projects bits of partial image information of at least one view of the scene or object at certain points of time only, preferably at a specified frequency between 10 Hz and 60 Hz,
- the light of at least of one projector is displayed in such a way that it can be seen from the front side within a solid angle that is at least $0.3\pi \text{ sr}$, so that the light of the said projector is seen by an observer as an essentially two-dimensional image, in which
- preferably each of the projectors used comprises at least one DMD chip, one LCD component, one CRT or one laser.

35. Autostereoscopic projection arrangement acc. to any of the Claims 24 through 34, characterized in that there is, in the viewing space, at least one viewing position for an observer's eye into which the holographic screen does not essentially radiate any of light projected by the projectors.

36. Autostereoscopic projection arrangement according to any one of the previous claims, characterized in that a color mask is provided in the beam path between the projector/the projectors and the projection screen, this color mask directing different color shares, preferably the colors red, green and blue, to different subpixels belonging to a pixel of the projection screen, in such a way that the subpixels, in addition to the pure colors red, green and blue, also render mixed colors, so that a greater number of colors per subpixel can be rendered and the resolution of the projection screen is thus increased.

37. Autostereoscopic projection arrangement acc. to Claim 36, characterized in that the width l_{new} of the colors that can be rendered per pixel results from

$$l_{\text{new}} = l \frac{n}{2n-1}$$

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wherein l is the size of one subpixel and n the number of subpixels per pixel, or in that the number p_{new} of views renderable per pixel increases according to the function

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$$p_{new} = p \frac{2n-1}{n}$$

wherein n is the number of subpixels per pixel, and p the number of different views of the scene or object, preferably with n=3 and p=8.

- 5 38. A method of manufacturing a holographic screen for use in an arrangement acc. to any of the Claims 24 through 37, comprising die following operations:
- a) Manufacture of an optical arrangement containing a multitude of the optical components permitting the optical imaging types or combinations of imaging types, or combinations thereof, listed in Claims 25 and 28;
 - 10 b) Positioning of an (as yet undeveloped) holographic screen in the vicinity of the said optical arrangement;
 - c) Exposure of the holographic screen to one or several coherent light sources, in which the holographic screen is preferably struck by a reference beam coming directly from the light source and an object beam which, coming also from the light source, has passed the said optical arrangement; preferably, this operation c) is repeated several times, preferably in such a way that every time that operation c) is executed the light source is given a different position relative to the said optical arrangement and, optionally, a different optical arrangement is used;
 - 15 20 d) Developing the holographic screen.
39. A method of manufacturing a holographic screen for use in an arrangement acc. to any of the Claims 24 through 37, comprising die following operations:
- 25 a) Selection of a multitude of optical components providing the optical imaging types or type combinations, or combinations thereof, specified in claims 25 and 28, and arrangement of these components in a grid of rows and/or columns;
 - b) Computation of the respective holographic interference patterns for the imaging types or combinations;
 - 30 c) Exposure of the holographic screen to one or several coherent light sources so that the computed holographic interference pattern is written onto the holographic screen;
 - d) Developing the holographic screen.

CERTIFIED TRANSLATION FROM GERMAN

40. A method of manufacturing holographic screens for use in an arrangement acc. to any of the Claims 24 through 37, comprising die following operations:
- Manufacture of at least two holographic screens by one or both of the methods claimed in Claims 38 and 39,
 - 5 - Assembling the holographic screens thus made into a one compound holographic screen.